Assessment of Runoff Toxicity from Coated Surfaces

Amy A. Rowe[1] and Mary K. Stinson[2]

[1] Primary Author - Oak Ridge Institute of Science and Education postdoctoral fellow at U.S. EPA, Office of Research and Development, 2890 Woodbridge Ave., Edison, NJ, 08837. rowe.amy@epa.gov Phone: 732-906-6823 Fax: 721-321-6640

[2] Corresponding Author - U.S. EPA, Office of Research and Development, 2890 Woodbridge Ave., Edison, NJ, 08837. stinson.mary@epa.gov Phone: 732-321-6683 Fax: 732-321-6640

Presented in this paper are results from a field and laboratory study of the potential runoff toxicity from coated surfaces. The study results qualified and quantified the types and concentrations of pollutants in runoff from surfaces sealed with a variety of products. Coatings are often applied to parking lots and driveways in order to enhance appearance and to protect the surface. Runoff from these surfaces may be a significant source of toxics to the environment. There are two types of sealcoat generally used in the United States today: asphalt emulsion and coal tar emulsion. Coal tar is a known human carcinogen and is detrimental to the health of a variety of organisms. Recent literature has suggested that coal tar based asphalt sealants have contributed to alterations in the survival, growth, and development of amphibians (Bryer et al., 2006). It has also been shown that coal tar contributes to embryo and larval mortality in fish (Kocan et al., 1996) and that coal tar inhibits the growth and biodiversity of macroinvertebrates and benthic phytoplankton (Oberholster et al., 2005). Runoff from roads and parking lots has been shown to have high levels of pollutants and to be toxic to both freshwater and marine organisms (Maltby et al., 1995; Pitt et al., 1995; Greenstein et al., 2004). A recent study has shown that runoff from sealed parking lots could account for a majority of polycyclic aromatic hydrocarbon (PAH) loadings in urban watersheds (Mahler et al., 2005). The sale of coal tar sealants has been banned in many residential supply stores (Home Depot, Lowe's), but coal tar sealants remain in use in a variety of industrial applications (Hogue, 2007). Due to the tendency of coatings to abrade over time, it is often recommended that they be reapplied to driveways/parking lots every two to three years (Dubey, 1999). The extensive use and reapplication of sealant could unknowingly be polluting urban streams and watersheds in the U.S.

Runoff from surfaces that have been treated with a variety of coatings has been investigated in both a qualitative and quantitative manner. These surface treatments include sealants, waterproofers, surface cleaners, crack fillers, and paints. Both the runoff from the sealed surfaces and the coatings, themselves, have been tested for toxicity via the MicroTox light output procedure. New asphalt was tested for background purposes and no toxicity was found in multiple runoff samples from the asphalt less than 24 hours after it was poured. However, preliminary results have shown that all of the coating products that were tested are toxic. Toxicity higher than 90% was seen in all products at full strength, 1:10 dilution, and 1:100 dilution. The waterproofer was the only coating that showed greater than 90% toxicity at a 1:1000 dilution.